

# Empowering Communities Through Knowledge Sharing in Circular Waste Practices: Plastic Recycling, Maggot-Based Organic Waste Processing and Sustainable Layer Farming at Bening Saguling Foundation

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## ABSTRACT

Increasing environmental challenges and the growing volume of waste have highlighted the need for sustainable and community-based waste management approaches. However, limited public awareness and lack of practical knowledge remain major barriers to the implementation of circular economy practices at the community level. This study examines the role of knowledge sharing in empowering communities through the implementation of circular waste practices at the Bening Saguling Foundation, West Bandung Regency. The program integrates plastic recycling, maggot-based organic waste processing, and sustainable layer farming as a comprehensive approach to waste utilization and community development. This research employs a qualitative approach with a case study design to explore the processes and impacts of an international community service program (PkM). Data were collected through direct observation, interactive discussions, and participant involvement during the program activities. The findings reveal that knowledge sharing, supported by participatory communication and hands-on practices, significantly enhances community understanding and engagement in circular waste management. Participants demonstrated improved awareness of circular economy principles and the ability to apply waste processing techniques, particularly in utilizing maggots as an alternative feed in layer farming systems. However, the sustainability of program implementation remains a challenge, highlighting the need for continuous mentoring and institutional support. Overall, the integration of knowledge sharing and practical training within a circular framework proves effective in strengthening community capacity and promoting sustainable environmental practices. This study contributes to the development of a replicable model for community empowerment based on integrated waste management.

Keywords: Circular Waste Management, Community Empowerment, Knowledge Sharing, Layer Farming, Maggot-Based Organic Waste

## 1. Introduction

Waste management issues remain a critical environmental concern in many regions, especially in developing countries such as Indonesia. These conditions not only give an effect to environmental pollution, but also lead to a decline in public health and ecosystem degradation. For that reason, a more comprehensive approach to waste management is needed, not only focusing to disposal but also to the reuse of waste through the circular economy concept which emphasizes the principles of reduce, reuse and recycle. According to study by the Coordinating Ministry for Human Development and Cultural Affairs of the Republic of Indonesia, in 2022 out of 202 Regencies/Cities accros Indonesia, national waste accumulation reached 21.1 million tons, of this total national waste production 65.71% or equivalents 13,9 million tons was properly

managed, meanwhile, the remaining 34.29% or 7.2 million ton of waste has not properly managed (Jannah et al., 2024). One of the effective approach is through community empowerment, especially through waste recycling craft waste activity, which is not only reduce waste but also generate economic value and significantly increase environmental awarness.

In the context of sustainable development, the circular economy approach has become one of the strategic solutions that is capable of integrating environmental, social and economic aspects. some of innovative practices has been developed by social community, such as recycling plastic waste into useful products, composting organic waste using maggots, and integrating these system with sustainable agricultural activities. Especially in layer farming. This model demonstrates that waste can be transformed into a productive resource that contributes to improving community welfare. In the perspective of communications science, the successful implementation of community based waste management practices is greatly influenced by the effectiveness of communication processes in conveying information, developing awareness, and encouraging public participations. The participatory communication approaches and knowledge sharing become a key to transferring knowledge between academics, practitioners and the community. Through this process, the society is not only an object, but also an active subject in sustinable environmental management.

The Bening Saguling Foundation in West Bandung Regency is one of the communities that has developed an integrated waste management practice based on circular economy, including program integrates plastic recycling, maggot-based organic waste processing, and sustainable layer farming. The international community service (PkM) activity that involves collaboration between Universitas Informatika dan Bisnis Indonesia (UNIBI) and University of Malaysia Terengganu (UMT) has become a strategic platform to stregthen knowledge sharing and the exchange of experiences in community based waste management practices. Although various circular economy based waste management practices have emerged, there are still gaps regarding knowledge dissemination, understanding among the community, and the optimization communication to encourage active participation. Moreover, research that integrates a communication perspective into international collaborative community service (PkM) is still relatively limited.

Based on this, this activity are aims at analyzing the knowledge sharing process in international community service (PkM) as a means for commmunity empowerment through circular economy based waste management practices at Bening Saguling Foundation, along with identifying the role of communications for increasing community understanding and participations to environmental sustainability practices.

## **2. Literature Review**

### **2.1. Community Empowerment and Knowledge Sharing**

Community empowerment is an approach that involves the community as the main subject in the development process, with the aim to increasing capacity of individuals and groups in order to enabling to manage potential and resolve issues independently and sustainably. Community empowerment can be defined as one of the processes of restoring or improving the capabilities of a group which are used in accordance with dignity and worth when fulfilling the responsibilities and the rights (Setiadi & Pradana, 2022). In the context of community service, empowerment not only focuses on increasing knowledge, but also involves strengthening skills and awareness regarding environmental issues. One approach that support this process is knowledge sharing, which refers to the mutual exchange information, experiences and skills among academics, practitioners, and the community on a participatory manner.

Knowledge sharing is a concept that describes interactions among individuals, involving two or more people, in the form communication processes that aims at improving and developing the capabilities of each participant. In this context, sharing knowledge is not only an exchange of informations, but also serves as a learning tool that encourages improvement both individual and organizational quality (Sumual et al., 2023). Knowledge in a specific field in forming community that capable of empowering society and fostering innovations through the programs (Satifa & Rusmana, 2023). Integrating of community empowerment and knowledge sharing enables a more effectives learning process because it involves two way interactions. Through this activity such as interactive discussion, training, and experiential learning, the community not only receives informations but also actively participates in the learning process. In the context of circular

economy based waste management, this approach encourages a paradigm of community's perception of waste as a valuable resource, thereby able to improving the participation of the community and empowerment in creating sustainable environmental management practices.

## **2.2. Circular Economy in Waste Management**

The circular economy is an approach to resource management that focuses on reusing waste through the principles of reduce, reuse, and recycle. This is different from the linear economic model, which is oriented toward a "take-use-dispose" pattern. The circular economy seeks to create a closed loop system where waste is reprocessed into valuable resources (Aprillia & Satya, 2023). In the context of waste management, this approach serves as a strategic solution to reduce waste volume while minimizing the impact of environmental pollution.

This is also further supported by Hisyam et al. (2025) who state that the circular economy is an alternative economy approach that has developed in response to environmental crises and resource constraints within the economic system. This approach aims to keep the value of materials and products within the economic cycle through strategies such as reduce, reuse, recycle, repair, refurbish, and remanufacture. Furthermore, the circular economy emphasizes the importance of regenerative product design and the development of efficient, low waste business models such as the product-as-a-service to support environmental sustainability and the optimal utilization of resources.

The implementation of the circular economy in sustainable waste management not only provides ecological benefits but also impacts the social and economic aspects of communities. Through practices such as plastic waste recycling, organic waste processing, and integration with productive activities, communities can gain added value from waste that was previously unused. Therefore, the circular economy functions not only as an environmental approach but also as a community empowerment strategy that promotes sustainability and independency at the community level.

## **2.3. Integrated Waste Management**

Integrated waste management represents a holistic approach to handling waste, combining various strategies, technologies, and policies to minimize environmental impact while optimizing resource recovery and waste reduction (Achillas & Vlachokostas, 2025). Integrated waste management is an approach that integrates the processing of various types of waste, both organic and inorganic, into a single systematic process, plastic waste as an inorganic waste material has a characteristics that make it difficult to decompose and therefore requires recycling to reduce environmental impact. Through recycling, plastic waste can be transformed into useful products, such as building materials or handicrafts, thereby not only reducing waste but also providing economic benefits to the community.

Furthermore, organic waste management can be effectively carried out through the use of maggots, which accelerate the decomposition process of waste. This method produces byproducts such as livestock feed and organic fertilizer that have economic value. Integrating plastic and organic waste management into a comprehensive system creates a mutually supportive cycle, where waste is not only reduced but also reused as a resource. This approach serves as an effective solution for supporting sustainable waste management while strengthening community based environmental economic empowerment.

## **2.4. Maggot Based Waste Management**

Maggot-based waste management is an innovative method in waste management designed to accelerate the decomposition process. Maggots have the ability to break down organic waste quickly and efficiently, thereby significantly reducing waste volume. Furthermore, the result of this process can be utilized as high protein livestock feed and as organic fertilizer. Maggot utilization in waste management aligns with the principles of the circular economy, which not only reduces waste but also transformed into a valuable economic resource. In the context of community empowerment, this method serves as an effective solution because it is easy to implement, relatively low cost, and has the potential to increase community income through the utilization of the byproducts generated.

## **2.5. Sustainable Agriculture Based on Waste Management**

Sustainable agriculture based on waste management is an approach that integrates food production with the utilization of waste as a resource. In this concept, waste generated from the domestic activities and the surrounding environment is no longer considered as material to be discarded, but also as an input that can be recycled in the production system, such as livestock feed or organic fertilizer. This approach aligns with the principles of the circular economy, which emphasizes resource efficiency and the reduction of environmental impact. Recently, there has been a rising focus on sustainable agricultural waste management practices through waste valorization techniques that can convert waste into valuable resources, and promoting a circular economy (Reddy et al., 2025).

In the practical terms, the waste management of organic waste using maggots can be integrated with livestock farming activities, particularly layer farming, whereby maggots are utilized as a high nutritional value alternative feed. Beyond increasing production cost efficiency this system also creates and interconnected cycle between waste management and food production. Therefore, sustainable agriculture based on waste management not only provides economic benefits, but also contributes to the sustainability of the environment and community independence in managing local resources.

## **2.6. The Role of Community in Implementing Sustainable Programs**

Communities and institutions serve a strategic role in initiating, managing, and ensuring the sustainability of environment based programs at the community level. As local actors, communities serve as the main drivers in raising awareness, facilitating participation, and organizing activities related to resource management. Meanwhile, institutions such as educational institutions or social organizations serve to provide support in the form of knowledge, guidance, and access to broader networks. The synergy between communities and institutions is an important factor in creating programs that are adaptive to local needs.

Sustainable community development needs to be based upon the greatest possible participation of the intended beneficiaries which is actual participation and planning collaboration (Macdonald, 2017). In the implementation of sustainable programs, the role of the community is not only limited to implementing activities, but also includes the processes of education, innovation, and the replication of best practices. The presence of an active community can encourage the formation of a collective culture of environmental awareness and the development of solutions based on local potential. Furthermore, the involvement of institutions, including through academic collaboration, strengthens program quality through scientific approaches and knowledge sharing. Therefore, collaboration between communities and institutions is the essential to ensuring that sustainable programs not only operate in the short term but also have a long term impact on society and the environment.

## **2.7. Previous Research**

Research conducted by Kilay and Wenno (2025) shows that community empowerment activities using the Participatory Action Research (PAR) approach in the management of inorganic waste can increase environmental awareness and encourage the implementation of the circular economy concept. Activities implemented at SMP Negeri 85 in Central Maluku through socialization, recycling training, and mentoring resulted in a 15% increase in waste management knowledge and the creation of various economically valuable creative products from plastic waste. This research confirms that a combination of education, practical skills, and active participant engagement can transform the community's perception of waste from a burden to a valuable resource. Furthermore, the program's success is influenced by supporting factors such as the sustainability of education and the availability of infrastructure.

## **3. Methodology**

### **3.1. Research Design**

This research uses a qualitative methods. Qualitative methods have emerged as indispensable tools for gaining deep insights and understanding complex phenomena. This method endeavors to demystify the process of qualitative research by offering a comprehensive overview and pragmatic strategies to navigate its multifaceted dimensions (Lim, 2024). This methods is used to explore the implementation process of

international community service (PkM) activities, particularly in the aspects of knowledge sharing, community participation, and the implementation of circular economy based waste management.

The research design used is a case study. A case study is expected to capture the complexity of a single case, and the methodology that enables this has developed within the social sciences (Ebneyamini & Sadeghi Moghadam, 2018). This study was implemented at the Bening Saguling Foundation in West Bandung Regency. This location was selected based on the presence of integrated waste management practices that include plastic waste processing, maggot-based organic waste processing, and integration with sustainable livestock farming activities. To obtain relevant data and information, the team observed the location directly and interacted and discussed with the managers and participants of the activities. The results of this process were used as a basis for understanding community needs and designing international community service (PkM) activities appropriate to the field conditions. The implementation of this study was carried out through several structured phases, which are:

- 1) Pre-Implementation Phase (Needs Assessment) was implemented through direct observation and discussions with the community to identify local issues and potential in waste management.
- 2) Socialisation and Knowledge Sharing aimed to providing an initial understanding of the concept of the circular economy and the importance of sustainable waste management through interactive methods.
- 3) Technical Demonstration and Implementation (Skills Development) focused on direct practice, where participants were trained to process plastic waste and organic waste using maggots in an applied manner
- 4) Evaluation and Reporting were performed to assess participants' level of understanding and participation through discussions and observations, along with compiling a report as a form of documentation and evaluation of the activities.

Through this qualitative method and case study design, the research is expected to provide a comprehensive overview of the implementation process of the international community service program (PkM) and its contribution to supporting community empowerment based on sustainable waste management.

## 4. Results and Discussion

### 4.1. Results

The results of the international community service (PkM) activity implemented at the Bening Saguling Foundation showed an increase in community understanding and engagement in circular economy based waste management, especially the processing of organic waste and maggots for livestock feed. The activities included several stages, there are pre-implementation (needs assessment), socialization and knowledge sharing, technical demonstration and implementation, and evaluation and reporting.

In the pre-implementation (needs assessment) stage, observations revealed that the community already possessed an initial awareness of the importance of waste management, though this was limited to simple sorting activities. The utilization of waste both plastic and organic was not yet being optimized. Furthermore, local potential was identified in the form of the availability of organic waste that could be processed using maggots for livestock feed.



**Figure 1. Documentation of Pre-implementation (Needs Assessment) Stage**

In the socialization and knowledge-sharing phase, participants demonstrated active engagement in discussions and the presentation of materials. They began to understand the fundamental concepts of the circular economy and the importance of sustainable waste management. Interactions between the community service (PkM) team and participants also revealed the showed an exchange of experiences relevant to the local environmental context.



**Figure 2. Documentation of Socialization and Knowledge Sharing Stage**

Furthermore, In the technical demonstration and implementation phase, participants engaged in practical exercises on processed of plastic waste and organic waste using maggots, which would later be used as livestock feed. The results of the activity demonstrated that participants were able to understand the practical steps of the waste processing process. Furthermore,, participants also showed interest in the utilization of waste processing byproducts, such as maggots as livestock feed.



**Figure 3. Documentation of the Technical Demonstration and Implementation Stage**

In the evaluation and reporting phase, participants showed an increased understanding, as evidenced by their participation in discussions and question and answer (Q&A) sessions. Most participants expressed an interest in implementing the practices that had learned in the daily lives. Furthermore, the entire series of activities was successfully documented as a part of the program report.



**Figure 4. Documentation of the Collaboration Between the International Community Service (PkM) Team and the Bening Saguling Foundation as the Project Partner**

Overall, the achievement of the international community service program (PkM) can be viewed in Table 1 below, which summarizes each stage of the activities along with the objectives, achievement indicators, and the results obtained during the program’s implementation. This table was compiled as a comprehensive evaluation to illustrate the extent to which the implemented activities were able to achieve the set targets, in terms of improving understanding, skills, and community participation. Furthermore, presenting the data in table form aims to provide a more systematic and structured overview of the correlation between activity stages and the resulting outputs, thereby facilitating analysis of the program’s overall effectiveness. therefore, this table serves not only as a summary of activity outcome, but also as an evaluation tool that can be used as a foundation for the development and refinement of future programs.

**Table 1. Community Service (PkM) Activities Results**

No	Activity Phase	Objective	Achievement Indicators	Achieved Outcomes
1.	Pre-Implementation (Needs Assessment)	Identify community needs and potential	Baseline data and identified issues	Identified limitations in waste utilization and maggot potential
2.	Socialisation & Knowledge Sharing	To improve understanding of the circular economy concept	Participant engagement and understanding	Participants are active and understand the basic concepts
3.	Technical Demonstration	To improve waste management skills	Be able to follow practical demonstrations	Participants are able to understand the processing
4.	Evaluation	To evaluate participants’ understanding	Participants’ responses and discussions	Participants demonstrate improved understanding

#### 4.2. Discussion

The results of the international community service (PkM) activity indicated that a community empowerment based approach, combined with knowledge sharing and direct practice, plays a crucial role in improving the community’s capacity for sustained waste management. The result from the initial phase indicated a gap between the community’s basic knowledge of waste management and actual practices in the field. This aligns with the literature review, which emphasizes that the success of waste management is determined not only by the level of awareness but also by the community’s ability to practically implement that knowledge.

The implementation of the socialization and knowledge sharing phases demonstrated that a participatory communication approach can improve community understanding more effectively. Two way interaction between the international community service (PkM) team and participants facilitates the exchange of

experiences relevant to local conditions. However, this strengthens the concept that knowledge sharing in community empowerment serves not only as information transfer, but also as a collective learning process that encourages active community engagement. therefore, this approach is more effective than one way communication methods in developing sustainable awareness and understanding.

In the technical demonstration phase, the results showed that experiential learning was a crucial factor in improving community skills. Participants had an easier to understanding the process of processing plastic waste and organic waste using maggots when they were directly involved in the activities. These result support the literature stating that community empowerment is more effective when accompanied by practical activities that allow the community to learn through direct experience. Furthermore, the integration of organic waste management with the use of maggots as livestock feed also reflects the practical application of the circular economy concept at the community level.

However, evaluation results indicate that while there was an improvement in understanding and skills, the main challenge was the sustainability of 's implementation. Behavioral change among the community cannot be achieved through short term interventions, but require ongoing guidance and support from the community and relevant institutions. The results suggests that the success of the program depends not only on the quality of activity implementation, but also on the sustainability of the system established after the activities conclude.

In general, this international community service program (PkM) successfully demonstrated that the integration of community empowerment, knowledge sharing, and circular economy based waste management practices can significantly improve community's capacity. The result strengthen previous research finding that emphasize that importance of participatory and community based waste management approaches. therefore, this program not only contributes to improving environmental awareness, but also opens opportunities for developing sustainable community empowerment models based on integrated waste management.

## **5. Conclusion**

The international community service (PkM) activity that implemented at the Bening Saguling Foundation demonstrates that a community empowerment approach based on knowledge sharing and practical practice is effective in improving the community's understanding and skills in sustainable waste management. Through systematic activity stages, start from needs identification to evaluation, the community not only gained knowledge about the circular economy concept, but also was able to understand its practical application through the processing of plastic waste and organic waste using maggots.

The results of this research also indicate that experiential learning has a crucial role in improving program effectiveness, compared to purely theoretical approaches. Furthermore, active community involvement in the knowledge sharing process is a crucial factor in increasing participation and awareness regarding environmental management. However, the sustainability of program implementation remains a challenge, which requires further mentoring and institutional support to ensure that the introduced practices can be consistently applied in the long term.

Finally, this international community service (PkM) activity contributes not only to improving community's capacity, but also to developing an empowerment model based on integrated waste management that can be replicated in other communities. Moving forward, efforts to strengthen collaboration among academics, communities, and relevant institutions are needed to support program sustainability and expand the resulting impact.

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